2000

Chief Inspector of Mines

Annual Report

Ministry of Energy and Mines
Mining Division

TABLE OF CONTENTS **PAGE**

Foreword 3

1.1 Mine Health and Safety Function 4

1.2 Mining Administration Function: non-health and safety component 4

1.3 Land Use 5

2.1 Occupational Health Group 5

2.2 Mechanical Engineering, Electrical Engineering and Emergency Preparedness 6

2.3 Competitions and Awards 9

2.4 Examinations and Certifications 14

2.5 Accidents and Incidents 20

2.6 Summary of Mine Production 22

2.7 Volume of Inspections 23

3.1 Notices of Work 24

4.1 Reclamation 24

4.2 Geotechnical/Mining Roads 31

Foreword

The Chief Inspector of Mines is appointed by the Minister of Energy and Mines to administer the Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia.

The Chief Inspector of Mines is also the director of the Mines Branch which functions through a central office in Victoria and five regional offices: Cranbrook, Kamloops, Nanaimo, Prince George and Smithers, plus a satellite office located in Fernie. Personnel in each of the regional offices are generally comprised of a regional manager supported by diverse technical and administrative staff. The regional manager in the Cranbrook office is responsible for the satellite office in Fernie.

Information about the Ministry and copies of Ministry publications are available through the following options:

Ministry Web site:
www.gov.bc.ca/em

Queen's Printer Publications Index Web site:
www.publications.gov.bc.ca

Communications Division
PO Box 9324 Stn Prov Govt
Victoria, B.C. V8W 9N3
Phone: (250) 952-0606
Fax: (250) 952-0627

Crown Publications Inc.
521 Fort Street
Victoria, B.C. V8W 1E7
Phone: (250) 386-4636
Fax: (250) 386-0221
www.crownpub.bc.ca

Further information on the activities of the various mining companies can be found in the Canadian Mines Handbook published each year by Northern Miner Press Limited (604) 688-9908 or from each mining operation. In addition, you can contact the Mining Association of B.C. (604) 681-4321 and the Coal Association of Canada (403) 262-1544. Each issue annual reports on the status of those sectors.

2.7 Mine Health and Safety Function

MANDATE/ACTIVITIES
The Mines Branch function derives its mandate from the Mines Act and its accompanying Health, Safety and Reclamation Code for Mines in British Columbia (the Code).

The Code is reviewed on an ongoing basis, by the code review committee comprising representatives from labour, industry and government, and chaired by the Chief Inspector, to ensure it remains current with new technology, mining practices and health and safety concerns. The current edition of the Code was released in April 1997.

The key mandate of the branch, with respect to health and safety, is to ensure worker health and safety, and public safety. In order to accomplish this, the branch functions include:

- the review of health and safety related aspects of mining and exploration proposals;
- mine inspections and the close monitoring of mining activity for conformance with the Mines Act and Code, and the approval of mine plans with regard to health and safety concerns;
- the collection of data and maintenance of records with respect to accidents, dangerous occurrences, inspection frequencies and audiometric (hearing test) data; and,
- participation in research projects.

As part of the ongoing development of the Mines Branch, a new system of managing Notices of Work, mine visits, and dangerous occurrences has been implemented to replace an old DOS system that failed during the year. The new system is known as the Mine Management System (MMS) and is being expanded and developed to include all of the branch functions associated with a mine and our visits to the mine.

2.8 Mining Administration Function - non-health and safety component

MANDATE/ACTIVITIES
The Mines Branch administers and regulates the full mining cycle, including exploration, development, production, reclamation and closure for metal, placer, industrial mineral and coal mines, and gravel pits and quarries. This mandate includes the review of applications and issuance of permits under Section 10 of the Mines Act for all mining activities including major mining projects subject to the Environmental Assessment Act, establishment of geotechnical and reclamation standards and security levels, participation in regional and subregional planning, and in reviews of draft legislation and policies being developed by other agencies. Branch staff also provide guidance and assistance to companies and individuals exploring for minerals, and monitor exploration and mining activities in order to provide policy advice to government.

In addition to health and safety functions, branch inspectors address environmental and social sensitivities of proposed and permitted mines. The process for review of Mines Act permit applications includes consultation with other government agencies and affected stakeholders, including First Nations, to identify concerns to be addressed through site-specific permit conditions. Inspectors monitor mining activities to ensure compliance with these permit conditions and take enforcement actions if necessary.

1.3 Land Use

MANDATE/ACTIVITIES

Branch staff participate in all levels of strategic and operational land-use planning throughout B.C. This includes regional, subregional (referred to as LRMP), landscape unit, local resource use, watershed management, wildlife management, recreational, access management, and sensitive area planning, as well as selection of new protected areas. In addition, various interagency referrals, including commercial recreation applications, proposed road deactivation, and draft Municipal Act zoning bylaws are handled. The overall aim is to optimize opportunities for exploration development of the province's subsurface resources in a context that integrates these activities with other land uses.

2.1 Occupational Health Group

ROLES AND RESPONSIBILITIES

The Code requires that mine managers develop a written occupational hygiene monitoring program. Larger operations in particular are required to establish procedures and to perform their own measurements of chemical and physical hazards to which workers were exposed in the workplace. This includes, among others, dusts, silica, respirable combustible dust, noise, gases and fumes, radiation (ionizing and non-ionizing) and heat/cold stress.

The Occupational Health (OH) group provides its expertise in recognizing, evaluating and controlling these conditions as well as assistance in developing individual programs. In addition, the group makes comparative measurements to ensure companies follow proper methodology and obtain accurate results. Underground mine ventilation and workplace hazardous materials information system programs are also included in the group's responsibilities.

Mine managers are also required to provide their occupational health and safety committees with training with respect to the prevention and reporting of musculoskeletal disorders. Such disorders include lower back pain, carpal tunnel syndrome and tendonitis.

The OH group was also involved in providing training to occupational health and safety committees at mines in these subjects.

STRUCTURE AND ORGANIZATION
During 2000, there were five people in the OH group, a manager, three industrial hygiene inspectors and one administrative assistant. One additional ergonomist intern was hired under the youth internship program.

SUMMARY OF ACTIVITIES
There were a wide variety of occurrences and situations in 2000 which required attention from the OH group. Of note were:

- considerable concern by neighbours of smaller quarry and sand and gravel operations where dust and noise were involved, requiring a number of investigations; and,
- the review of several asbestos abatement projects during building renovations and demolitions at minesites across the province.

In addition, the OH group:

- maintained, upgraded software, and input data to the Mines Branch audiometric database, which records the results of hearing tests that are undertaken at mine sites across the province.
- provided training courses for mines' industrial audiometric technicians;
- provided training to mine safety personnel with respect to occupational health hazards and applicable occupational monitoring methods;
- published and distributed to all major mines a revised manual entitled "Workplace Monitoring Procedures Manual"; and,
- developed and published a new manual entitled "Work Related Musculoskeletal Disorder Prevention Guide for Mining" and delivered a number of seminars to mine occupational health and safety committees with respect to this important topic.

In addition to the above, OH inspectors conducted on-site inspections of mines to fulfill their mandate to monitor workplace conditions.

2.2 Mechanical Engineering, Electrical Engineering and Emergency Preparedness

ROLES AND RESPONSIBILITIES
Mechanical and electrical inspectors ensure that all mechanical and electrical equipment installed and used at mines complies with the Mines Act and the applicable codes and standards, and that the equipment is maintained in acceptable condition so that its operation causes no hazard to people or property.

The emergency preparedness inspector ensures that all mines have an emergency preparedness plan capable of being implemented at any time in response to any emergency occurring at the mine site. Emergency preparedness plans are integrated with a province-wide protocol that provides for aid and assistance from outside sources, to any mine experiencing an emergency, if required.

STRUCTURE AND ORGANIZATION

In 2000, there were eight staff in the mechanical/electrical group: one manager, two engineers, four technicians and one administrative assistant.

SUMMARY OF ACTIVITIES

Mechanical Engineering

Inspections were carried out at all of the major mining operations, including the larger quarries and sand and gravel pits.

Several submissions of data pertaining to new or modified off-highway haul trucks were approved, and numerous minor modifications on various items of mobile equipment were also reviewed, with approvals issued in the majority of cases.

Delivery of new machinery and equipment to mines, together with the steady upgrading of much of the existing items, results in mines in British Columbia maintaining their competitive capabilities. At the same time, safety systems on new and upgraded equipment are usually enhanced, often as a result of new technology employed in such systems. The highly automated and complex control systems found on the equipment demands a high level of skill from those who operate and maintain the equipment. Branch staff involved in reviewing engineering drawings associated with the safety systems on such equipment, and subsequently having to perform field inspections on the items, endeavor to keep abreast of the many changes and innovations. In addition, inspectors, in collaboration with the mines, have to ensure that people operating equipment are aware of how equipment modifications may affect its operating functions, and ensure operators understand the consequences of failures occurring in installed control or sensing systems.

Responsibility for the mine safety audit system remains the responsibility of the manager of the section. In 2000, a full safety audit was conducted at the Eskay Mine (underground metal) maintenance facility. Warehousing and record keeping audits were conducted at Cewe, Central Aggregates, Valley Gravel Sales, Columbia Bitulithic, Frazer Valley Aggregate, Toes Bros., Mainland Sand and Gravel, and Pit River Pit. An Occupational Health and Safety Committee audit was conducted at Boliden Myra Falls, a mill audit at Endako Mine, and a training audit at Kemess Mine.

The safety audit program is designed to investigate how well a safety and health program has been implemented at a mine. A mine is visited by an audit team, consisting of between two and five staff members and a representative cross section of employees at the mine, who are interviewed, and an inspection is conducted of the records forming part

of the safety and health program instituted by the company. Audit questions and record checks are based primarily on the requirements of the Mines Act and regulations pertaining to the health and safety of workers. Both the interviews and records checks enable the auditors to determine whether the program is well administered, and to determine how much knowledge employees have about how to perform their work tasks in a safe and healthful manner. When the on-site portion of each audit is completed, the information is analyzed and a report is issued to the mine manager who then discusses its contents with the occupational health and safety committee. Strengths and weaknesses of the program are highlighted in the report and a plan of action to improve the occupational health and safety program is developed at the mine. Follow up of the implementation records checks enable the auditors to determine whether the program is well administered.

Electrical Engineering
Electrical inspections were conducted at all major mines including the larger sand and gravel operations as well as the smaller operations that demanded an in-depth electrical inspection. Most mines are still continuing to upgrade their electrical equipment and systems in order to increase efficiency and reduce power consumption costs.

Emergency Preparedness
Mine emergency preparedness plan guidelines and mine emergency management plans were established in 1991, first published in October 1992 and last updated in January 1997. The guidelines are distributed to the mining industry to use when setting up on-site preparedness plans. The management plans are distributed to proponents within the plan and are also for use by ministry staff.

Mine Rescue Stations
Regional mine rescue stations were consolidated in 1999. All mine rescue equipment is now located in a single centrally located station in Kamloops. The station is under the supervision of the regional office administrator/resident engineer and the manager, emergency preparedness, in Victoria.

Mine Rescue Certifications
To qualify for mine rescue certification, mine employees must complete approved training and must pass written exams developed for various types of mining, as per Part 3 of the Health, Safety and Reclamation Code for Mines in British Columbia.

The Mines Branch is responsible for certifying miners in several categories of mine rescue, as listed below.

Mine Rescue Certificates issued in 2000:

Type	Number Issued	Re-certified
Survival mine rescue	98	0
Underground mine rescue	18	79
Surface (open-pit) mine rescue	125	141
Gravel pit mine rescue	21	15
Total Certificates Issued	262	235

Mine Rescue Instructor Certificates issued in 2000:

Type	Number Issued
Underground	2
Surface (open-pit)	7
Total Instructor Certificates	9

2.3 Competitions and Awards

ROLES AND RESPONSIBILITIES

The primary mandate of the Mines Branch is to ensure worker health and safety, public safety and suitable reclamation and protection of the land and watercourses affected by mining and exploration work.

The Mines Act, and the Health, Safety and Reclamation Code for Mines in British Columbia stipulate the legal responsibility of provincial mining companies in meeting this mandate; however, many B.C. mining companies and their individual workers voluntarily and consistently exceed these legal requirements. Through the efforts of these individuals, companies and staff of the Ministry of Energy and Mines, mining is among B.C.'s safest heavy industries.

Mine rescue competitions, first-aid competitions, and safety awards all contribute to the overall climate of safety. Reclamation awards acknowledge those companies that go beyond what is called for in their mining plans, by conducting superior research and introducing innovative techniques to restore the land.

MINE RESCUE COMPETITIONS

The Provincial Mine Rescue competitions are judged by Branch mine inspectors and industry personnel who are responsible for all aspects of worker and public safety in B.C.'s mining industry. This year's competition was held in Kimberley on June 10th.

Surface Mine Rescue Champions
The East Kootenay Zone competitions were held in Sparwood. The participating teams were as follows:

- Luscar Ltd. – Line Creek Resources
- Fording Coal Ltd. - Greenhills Operations
- Elkview Coal Corporation – Elkview Mine
- Fording Coal Ltd. - Coal Mountain
- Fording Coal Ltd. – Fording River Operation

The North / South Central Zone competitions were held in Kimberley on June 8th. The participating mines were as follows:

- Thompson Creek Mining - Endako Mines
- Bullmoose Operating Corp. – Bullmoose Mine
- Northgate Exploration Ltd. – Kemess Mine
- Mount Polley Mining Corporation
- Highland Valley Copper
- Ashgrove Cement Company – Blubber Bay Quarry

The first, second and third placed teams from each regional zone are eligible to compete in the provincial competition on June 10, 2000 in Kimberley. These teams are:

East Kootenay Zone

- Luscar Ltd. – Line Creek Resources
- Fording Coal Ltd. - Greenhills Operations
- Elkview Coal Corp. – Elkview Mine

North / South Central Zones

- Thompson Creek Mining Ltd. - Endako Mines
- Highland Valley Copper
- Mount Polley Mining Corporation

Provincial Competition
Surface Mine Rescue Champions
The team from Luscar Ltd. – Line Creek Mine won the 2000 surface mine competition and is the provincial champion. Team members were: Frank Walsh (Captain), Terry Walsh, Bill Bolen, Greg McLean, Kevin Hildebrandt, Tony Hickling, Tim White (Spare), Gerald Mottl, Coach.

Surface Bench Competition
The surface bench competition originated in 1995. The trophy is awarded to the surface mine rescue team that excels at the practical bench competition. The practical bench task is designed to test the individual team members on their knowledge and practical skills in mine rescue equipment and techniques. The competition is held in memory of Maurice Boisse, Mine Rescue Team Coach, Island Copper Mine. The award was won in 2000 by Fording Coal Ltd. – Greenhill's Operations.

Underground Mine Rescue Champions
Three underground mine rescue teams competed in the provincial competitions in 2000 as follows:

- Homestake Canada Inc. - Eskay Creek Mine
- Cominco Ltd. - Sullivan Mine
- Boliden Westmin (Canada) Ltd. - Myra Falls Operations

Homestake Canada Inc. – Eskay Creek Mine team won the underground mine rescue competition and are the provincial champions. Team members were: John Arnold (Captain), Steve Raptis (Vice-Captain), Jason Gooding, Tom Cheveldave, Martin Rozell, Lawrence Derrick, Jim Roger (Coordinator), Hal Uhrig (Coach).

Underground Bench Competition
The underground bench competition originated in 1978. The competition is held in memory of the late Barry Abbott, Captain of the Cominco HB mine rescue team who, in 1976, won the Canadian Championship. The award was won by the team from Boliden Westmin (Canada) Ltd. - Myra Falls Operations, Rick Kretzschmar (Captain).

Underground Bench Technician
The underground bench technician plays a very important role prior to and during a mine emergency. The Technician is responsible for the care, maintenance and servicing of the mine rescue teams' breathing apparatus. The underground bench technician task was prepared to test the technician's skills and competency at assembling and testing breathing apparatus. The bench technician competition was won by Ron Schofer of Cominco Ltd., Sullivan Mine.

First Aid Competitions
In the first-aid category there are two separate competitions; three-person first-aid competition; and the first-aid component of the underground and surface mine rescue competition.

Three-Person First Aid
The first provincial miner's three-person first-aid competition was held in 1978. The competition simulates accident situations - one team member acts as the patient and the other two team members render first aid. The St. John's standard course is the training standard, and only those who work in or about a mine are permitted to enter this competition.

This competition was designed as an extension of training for workers in basic first-aid skills, in order that they may assist their fellow workers at the face or at the work place in the event of an injury or medical emergency.
Competing teams at the provincial level were as follows:

- Thompson Creek Mining Ltd. – Endako Mines
- Bullmoose Operating Corp. – Bullmoose Mine
- Highland Valley Copper
- Elkview Coal Corporation – Elkview Mine
- Cominco Ltd. – Sullivan Mine
- Cominco Ltd. - Sullivan Concentrator

The 2000 champion team was from Cominco - Sullivan Mine. The team members were Rick Peacosh (Captain), Vic Mann, Cal Kilback and Ron Schofer (Coach).

First-Aid Component
The judging of the first-aid component is in conjunction with the provincial surface and underground mine rescue competition.

Underground First Aid
Cominco Ltd. introduced a new award for the best first aid by an underground mine rescue team. The award known as the "Sullivan Cup" was presented to Homestake Canada Inc. – Eskay Creek Mine.

The National Western Regional Competitions
To improve Canada's mine rescue mutual aid response capability, the national mine rescue committee, consisting of representatives from across Canada, has divided the country into three specific regions - East, Central and West. The rationale is based on the expediency of responding with teams and equipment from adjacent provinces and territories and to coordinate procedures within those jurisdictions.

The national western regional committee, consisting of representatives from Alberta, B.C., Saskatchewan, Northwest Territories, United States and the Yukon Territories, in conjunction with the city of Fernie (sponsor of the event), initiated underground and surface mine rescue competitions in 1993. The competitions are conducted on a biennial basis and serve to provide a medium for mine rescue teams to exercise their skills and to promote and coordinate an interchange of procedures and training standards.

The Fourth National Western Regional Mine Rescue Competition was held in Fernie, B.C. on September 10 and 11, 1999; the next is due in 2001.

The teams eligible to compete in 2001 were the underground and surface mine rescue winners from the 2000 and 2001 provincial, territorial and United States competition events.

Safety Awards Competitions
The presentation of awards at the 39th (2000) Annual Mine Safety Awards will take place at the Harbour Towers Hotel in Victoria on April 23, 2001. The winners for 2000 were as follows:

Small Underground Mines
This award was donated by the West Kootenay Mine and Industrial Safety Association in 1951 to encourage and promote safety in small underground mines. Since 1956, the competition has been open to qualifying mines throughout the province. The award is given to the mine having the lowest compensable accident rate after working from 2,500 to 30,000 shifts per year, at least one third of which were underground. The mine must have operated for at least nine months during the calendar year. A fatality automatically disqualifies a mine for that year. The 2000 winner was Quinsam Coal Corporation.

Open-Pit Mines and Quarries
The John Ash Award is presented to the mine that has worked more than 1,000,000 hours in a year and attained the lowest compensable injury frequency rate. The 2000 winner was Highland Valley Copper.

The Edward Prior Safety Award is presented to the mine with the lowest compensable injury frequency rate for 200,000 to 1,000,000 hours worked. The 2000 award was won by Elkview Coal Corporation.
The Stewart-O'Brian Safety Award is presented to the mine with the lowest compensable injury frequency rate for 35,000 to 200,000 hours worked. The award was shared by five mines:

- Ash Grove Cement Company - Blubber Bay Quarry
- Pier Mac Sand & Gravel – Kelowna Extension
- Steelhead Aggregates Ltd. - Skway Pit
- Westroc Inc. - Elkhorn Mine and Extension
- Allard Contractors Ltd. - Pit "D"

Certificates of Achievement
Certificates of achievement are presented to those mines with a zero compensable injury frequency rate and which have accumulated 15,000 to 35,000 employee hours. There were a total of ten mines that qualified for certificates for work conducted in 2000:

- Plateau Construction Ltd. – Harper Ranch Quarry
- Steelhead Aggregates Ltd. - Cannor Road Pit
- Steelhead Aggregates Ltd. – Deroche Pit
- Steelhead Aggregates Ltd. – Tower Road Pit
- Westcoast Aggregates Ltd. – Pit No. 12
- Fraser Valley Aggregates – Pit No. 15
- Salmon Arm Ready Mix Ltd. – Gleneden Pit
- Okanagan Aggregates Ltd. – Okanagan Pit

- Shawnigan Gravel Supplies Ltd. – Owl Road
- Coquitlam Sand & Gravel – Mantle Creek Pit

Occupational Health and Safety Committee (OHSC) Award
This award is presented to the occupational health and safety committee at a mine that has demonstrated excellence in its operations and policies that relate to their OHSC. The 2000 award went to Elkview Coal Corporation.

National Safety Awards - John T. Ryan Trophies
The John T. Ryan trophies are awarded by the Mine Safety Appliances Canada Limited as a memorial to the founder of the company. The 2000 Canada trophies were awarded by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) to the metal mine, the coal mine and the select mine which in the previous year (1999) experienced the lowest reportable injury frequency per 200,000 employee hours in all of Canada. There are two trophy categories, Canada and Regional.

Metal Mines
Awards for this category include a Canadian trophy and four regional trophies. B.C. mines compete in the B.C. and Yukon region, based on statistics from 1999. The 2000 Canada winner was Cameco Corporation, McArthur River and Key Lake mines, Saskatoon, Saskatchewan. The 2000 regional winner from B.C. and Yukon was Homestake Canada Inc. - Eskay Creek Mine.

Coal Mines
There is a single Canadian trophy in this category which recognizes both surface and underground mines. The presentations in 2000 were given to two winners, based on statistics from 1999:

- N.B. Coal Limited - Minto, New Brunswick
- Fording Coal Limited - Genesee Operations

Select Mines
Awards for this category which are restricted to open-pit and strip mines for any mineral (excluding coal) were presented in 2000 based on statistics from 1999. There is a Canadian trophy and two regional trophies awarded. B.C. mines compete in the western region, which includes all of Canada, west of the Manitoba-Ontario border. The 2000 Canada trophy was won by Fundy Gypsum Company, Windsor, Nova Scotia and the 2000 western region award was won by Syncrude Canada Ltd.

2.4 Examinations and Certifications

Section 26 of the Mines Act requires that every person employed at a mine, where required by the Code, be under the daily supervision of a person who holds a valid and appropriate certificate as required by the Code. The appropriate certification is specified in Part 1.12 of the Code. Recipients of a valid permanent certificate require re-examination every five years regarding their current knowledge of the Code.

BOARD OF EXAMINERS

The Board of Examiners comprises the Chief Inspector of Mines as chair and other inspectors appointed by the Chief Inspector. During 2000, F.W. (Fred) Hermann chaired the board, with R. Booth, B. Good, E. Mehr and J. Worsfold (administrator) as members. The board is responsible for examination of applicants for shiftboss certificates and certificates of competency, for considering applications for interchange certificates of competency, for issuing certificates and for conducting a review of all suspended certificates. The board is also responsible for administering blasting and supervisor certification.

Shiftboss Certificates

Seven different types of shiftboss certificates are issued:

- Open-pit
- Open-pit restricted (sand and gravel pit)
- Open-pit restricted (placer)
- Underground metal
- Underground restricted (crushing and conveying)
- Underground restricted (placer)
- Underground coal (Fireboss statistics included under certificate of competency)

A provisional certificate, which may be issued on a one-time basis, is valid for a period of six months.

An applicant for a shiftboss certificate must hold an appropriate blasting certificate (if blasting is carried out), a mine rescue certificate (surface or underground as required), and a valid first-aid certificate. The applicant must also have obtained acceptable experience in and about a mine and pass a written examination on knowledge of the Mines Act and the Code.

Under Part 1.13.10(1) of the Code, a holder of a shiftboss certificate must revalidate every five years. This is accomplished by successfully writing an examination on knowledge of the Mines Act and the Code as well as holding valid appropriate supporting certifications (blasting, mine rescue and first aid).

Total Shiftboss Certification Activity 2000

Activity	New Certificates	Revalidation
Applications received	38	80
Examinations written	23	83
Number passed	23	82
Number of permanent certificates issued	24	80
Provisional certificates issued	15	0

Shiftboss Certificate Suspensions
(Part 1.13.12 of the Code)

In 2000, there were two shiftboss certificate suspensions.

1. Underground Certificate #UG2225: Suspended for one month (January 25 – February 24, 2000), under Part 1.10.2 Health, Safety and Reclamation Code for Mines in BC. Part 1.10.2 states that a supervisor shall not knowingly perform or permit a worker to perform work which is, or could create, an undue hazard to the health or safety of any person. Reinstatement requirements: None stated.

2. Open Pit Certificate #OP1376. Suspended for two weeks (February 4 – 17, 2000), under Part 8.5.13 of the Code which requires that no equipment shall be allowed within 8 m of any charged blasthole except licensed explosives vehicles, explosives vehicles that have the exhaust directed above the vehicle cab or other equipment authorized by the Chief Inspector. Reinstatement requirements: None stated.

CERTIFICATES OF COMPETENCY
Managers and certain other supervisory officials at an underground coal mine, when required by the Chief Inspector must hold a certificate of competency. Three types of certificates are issued:

- a first-class certificate which is required when 30 or more persons are employed underground;
- a second-class certificate which is required when fewer than 30 persons are employed underground; and,
- an underground coal fireboss certificate may be used if fewer than 10 persons are employed.

An applicant for a certificate of competency must hold the necessary academic certification, have obtained acceptable experience and must pass written examinations on mining practice and technology and on knowledge of the Mines Act and the Code. An interchange certificate may be granted to an applicant who holds an equivalent certificate granted by a jurisdiction outside the province, when they have proven their knowledge of the Code.

There were no new or revalidated first- or second-class certificates of competency issued during 2000. There were no recorded suspensions, cancellations or reprimands for either first- or second-class certificates of competency for 2000.

Total Underground Coal Fireboss Certification 2000

Activity	New Certificates	Revalidation
Applications received	2	1
Examinations written	2	1
Number passed	1	1
Number of permanent certificates issued	1	1
Provisional certificates issued	0	0

Supervisor Certificates
Every worker, other than those supervised by a shiftboss or the holder of a certificate of competency, and other than office employees, must work under the supervision of the holder of a supervisor certificate. Currently, four types of supervisor certificates are issued:

- Open-pit
- Sand and gravel or placer
- Underground
- Exploration

These four replace the previous 12 categories to better recognize that the workforce can, and does, move about the mine site. Where 12 workers or less are employed in a surface mine operation, supervision by the holder of a supervisor certificate, rather than the shiftboss certificate, may be acceptable.

An applicant for a supervisor certificate may be required to hold a valid first-aid certificate and must pass a written examination on knowledge of the Mines Act and the Code. A provisional certificate, which may be issued on a one-time basis by the mine manager, is valid for a period of six months.

A supervisor certificate must be revalidated every five years (Part 1.13.10(2) of the Code) by successful examination on knowledge of the Mines Act and the Code. The holder is also required to hold a valid first-aid certificate.

Supervisor Certificate Statistics Activity 2000

Activity	New Certificates	Revalidation
Applications received	341	74
Examinations written	278	75
Number passed	272	74
Number of permanent certificates issued	268	74
Provisional certificates issued	46	0

Supervisor Certificate Suspension
(Part 1.13.11 of the Code)

In 2000, there was one supervisor certificate suspension.

1. Open Pit Certificate #92-098. Suspended for one month (February 5 – March 5, 2000) under Parts 4.11.2, 4.11.4(1) and 4.11.5 Code. Part 4.11.2 deals with disconnecting the power source on equipment to be worked on and ensuring lock-out and tagging. Part 4.11.4(1) requires each person working on equipment requiring lock-out to affix his own lock and tag to the lock-out device and removal of them on completion of his work. Part 4.11.5 allows the option of a supervisor applying his own lock at the end of a shift until the workers coming on shift can apply their own locks. Reinstatement requirements: None stated.

Blasting Certificates
Blasting certification is covered under Part 8.2 of the Code. Types of blasting certificates are:

- Basic
- Exploration
- Surface
- Underground
- Underground coal (Shotfirer)
- Electrical
- General-which includes all categories (except Underground Coal)

Blasting certificates do not have an expiry date. Provisional certificates can be issued for a period not exceeding 90 days. During 2000, 81 blasting certificates were issued.

Blasting Certificate Suspensions
(Parts 8.2.6, 8.2.7 of the Code)

During 2000, there were four suspensions, one cancellation, and one reprimand recorded against blasting certificates.

1. #42223 and #42366. Both suspended two weeks (January 13 – 28, 2000) under Parts 8.6.2(1) and 8.6.2(2) of the Code which requires that before blasting, the blaster clear the blast danger zone of all persons and ensures that all entrances to the blast danger zone be guarded to prevent access.

   Reinstatement Requirements: None stated.

2. #39135 Suspended for four months (September 20, 2000 – January 21, 2001) under Parts 8.6.2(1) and 8.6.2(2) of the Code which requires the blaster to clear the blast danger zone of all persons and adequately guard the blast danger zone from access before blasting takes place.

   Reinstatement Requirements: None stated.

3. #39009 Suspended for one month (October 27 – November 27, 2000) under Parts 8.3.8(2), 8.3.9(1)(a), and 8.4.2(1) of the Code. Part 8.3.8(2) requires explosives and detonators, if not used, to be returned to the magazine or storage box, and not to be hidden in or about the mine. Part 8.3.9(1)(a) states that no person shall commit a careless act with explosives or detonators. Part 8.4.2(1) requires that a vehicle used to transport explosives must have a separate compartment for the explosives which prevents them from coming into contact with any metal that could produce a spark.

   Reinstatement Requirement: Rewrite and pass a blasting certification examination.

4. #39071 Cancelled voluntarily August 8, 2000. The blaster had lost his wallet and was concerned that the blasting certificate would fall into inappropriate hands. He is no longer involved in the mining exploration business.

5. #36835 Reprimand March 7, 2000 under Parts 8.3.9(1)(a) and 8.1.10(1) of the Code. Part 8.3.9(1)(a) states that no person shall commit a careless act with explosives or detonators. Part 8.1.10(1) requires detonators be stored in a special, separate building designated as a "Detonator House" to which the rules for magazines apply (Part 8.1.8).

2.5 Accidents and Incidents

Dangerous and/or Unusual Occurrences
In 1999 the Ministry reviewed requests from the mines that we stop requiring the labour intensive MINACC to be filled in at the minesite, or that the MINACC be made compatible with their systems. To this end, the Ministry reviewed its computer needs which resulted in a plan to develop the Mine Management System (MMS) to replace MIS (Mine Information System). This system is being developed with a staged implementation starting with the replacement of the basic Mine Information System, then the peripheral systems that include MINACC. This implementation will continue throughout the year 2000.

The following accident information is produced from the MMS. The MMS was newly implemented in 2000 and the information presented represents approximately three months of the year 2000. The percentage is useful in that it may be compared to subsequent years as the system is developed.

LOCATION	COUNT	%
PIT	49	45.0
PLANT / MILL	25	22.9
MAINTENANCE (SHOP)	8	7.3
MAINTENANCE (FIELD)	6	5.5
HIGHWALL	3	2.8
DUMP	10	9.2
TAILINGS POND	2	1.8
OFFICE	1	0.9
DRY	0	0.0
UNDERGROUND GENERAL	5	4.6
UNDERGROUND FACE	3	2.8
UNDERGROUND OUTBYE / HAULAGE DRIFT	3	2.8

WORK PRACTICE	COUNT	%
EQUIPMENT FAILURE	26	24.0
INADEQUATE PLANNING	16	15.0
INADEQUATE MANAGEMENT	15	14.0
INADEQUATE EQUIPMENT	2	2.0
POOR WORK STANDARDS	27	25.0
ABUSE OR MISUSE	4	4.0
TRAINING	13	12.0
NOT FOLLOWING WORK PROCEDURES	28	26.0
OPERATOR ERROR	53	49.0

EQUIPMENT	COUNT	%
HAUL TRUCK	26	23.9
GRADER	0	0.0
LOADER	3	2.8
SHOVEL	9	8.3
DOZER	13	11.9
DRILL SURFACE	4	3.7
DRILL UNDERGROUND	1	0.9
PICKUP	7	6.4
LHD	1	0.9
CONVEYOR	4	3.7
ELECTRICAL	20	18.3
EXPLOSIVES	3	2.8
EXCAVATOR/BACKHOE	6	5.5
CRANE	0	0.0
FORKLIFT	0	0.0

GENERAL INFORMATION	COUNT	%
# OF PERSONS INVOLVED	108	
# OF PERSONS INJURED	22	
NEAR MISS	26	24.0
GEOTECHNICAL	7	6.0
FATALITY – MINING RELATED	1	1.0
FATALITY – NON MINING RELATED	1	1.0

2.6 Summary of Mine Production

The table below summarizes production and average employment at major British Columbia mine sites.

Statistics 2000[1]

Coal Mines	Annual Rated Plant Capacity (Tonnes)	Actual Tonnes Produced	% of Capacity	Days Mill Operated	Average Employment	Contract Employment
Bullmoose	2,300,000	1,416,102	62	212	249	-
Elkview	6,000,000	4,061,074	68	203	502	-
Fording Coal Mountain	2,800,000	2,291,873	82	234	172	-
Fording Greenhills	4,500,000	4,399,890	98	297	350	-
Fording River	9,500,000	9,008,388	95	333	747	-
Line Creek	3,600,000	2,558,000	71	350	401	-
Quintette[1]	5,000,000	1,760,000	35	157	225	-

Metal & Precious Metal Mines	Annual Rated Mill Capacity (Tonnes)	Actual Tonnes Milled	% of Capacity	Days Mill Operated	Average Employment	Contract Employment
Endako	10,950,000	9,395,673	86	365	225	5
Eskay Creek[2]	80,800	87,527	108	365	120	71
Golden Bear[3]	1,281,000	518,849	41	183	71	-
Highland Valley	49,776,000	49,693,800	100	365	952	89
Huckleberry	7,322,000	7,145,579	98	365	177	4
Kemess	17,520,000	14,138,000	81	275	438	-
Mount Polley	7,300,000	6,950,000	95	365	240	-
Myra Falls	1,460,000	1,166,624	80	355	432	-
Sullivan	3,000,000	1,613,210	54	234	536	20

Notes

1. The Quintette mine closed August 2000.
2. Eskay Creek ships ore as well as milling ore. Actual tonnes shipped were 121,000.
3. Golden Bear is a heap leach operation which operates from May to October. During the operating season, the average number of employees, including contracted employees, was 120. Actual tonnes milled reported represents tonned mined.

[1] The Mining Industry in British Columbia – 2001 PricewaterhouseCoopers

2.7 Volume of Inspections

In 2000, the Ministry introduced the Mine Management System (MMS) that allowed the tracking of mine visits and the issuance of orders at mines. The system was introduced progressively throughout the year, and the attached report reflects a part year on the MMS. As the two systems were not compatible, the total inspections for the year combining the two systems is presented as a total above the chart.

The following figures represent inspections performed by the Mines Branch. When an inspector conducts a mine site inspection on behalf of the branch, the inspector passes on to other branches anything that they may need to attend to. Note that the number of inspections is not a good indicator of the relative volume of activity of each office. Some regions contain a few very large mining operations, whereas others contain hundreds of smaller operations. Therefore, the length of time it actually takes to conduct an inspection varies from region to region.

While conducting inspections during 2000, mines inspectors issued 3,214 orders and shut down 45 pieces of equipment. The following were recorded in the MMS system which was introduced late in 2000:

MINE TYPE	INSPECTIONS	H&S ORDERS	SHUTDOWNS	ENVIRONMENTAL
Abandoned Mine	16	9	0	2
Custom Mill	7	43	0	0
Coal – Surface	64	274	2	0
Coal – Underground	1	2	0	0
Exploration – Surface	74	100	0	29
Exploration – Underground	12	16	0	12
Industrial Minerals – Surface	37	133	0	5
Industrial Minerals – Underground	6	0	0	2
Metal Leach – Surface	0	0	0	0
Metal Mine – Surface	19	75	0	0
Metal Mine Underground	38	175	0	8
Non Assignable / Unidentified	1	2	0	0
Placer – Surface	43	37	1	84
Placer – Underground	0	0	0	0
Rock Quarry	22	30	0	15
Sand/Gravel Pit	282	527	3	140
TOTALS	**622**	**1,423**	**6**	**297**

3.1 *Notices of Work*

The following Notices of Work were entered into the MMS in 2000:

TYPE	NOTICE OF WORK APPLICATIONS	PERMITS ISSUED	AVERAGE DAYS TO ISSUE
Mineral and Coal Exploration	300	74	40
Mineral and Coal – Other	44	9	46
Placer	481	66	45
Sand and Gravel	197	84	73
Total	**1022**	**233**	**52**

The breakdown of the 2000 Notices of Work by area is as follows:

REGION	PLACER	SAND & GRAVEL	MINERAL & COAL	TOTAL
Kootenay	41	30	66	137
Kamloops	60	29	64	153
Nanaimo	17	64	36	117
Prince George	265	47	73	385
Smithers	98	24	103	225
Other		3	2	5
Total	**481**	**197**	**344**	**1022**

The areas covered by the regions are as follows:

Southwest = Nanaimo, Lower Mainland and Vancouver Island areas
Central = Kamloops, Okanagan and Thompson areas
Kootenay = Cranbrook and Elk Valley areas
Northeast = Prince George, Omineca, Horsefly and Valemont areas
Northwest = Smithers, Skeena and Queen Charlottes areas

4.1 Reclamation

ROLES AND RESPONSIBILITIES

Reclamation and environmental protection are a major component of all mineral exploration and mine development activities in B.C. Since 1969, mining companies have been required by law to reclaim all lands disturbed by mining. B.C. was one of the first jurisdictions in Canada to enact mine reclamation legislation, and the first to extend this policy to exploration sites. Mining companies are required to obtain a permit approving the mine plan, the program of protection of the land and watercourses, and the

reclamation program. Mining companies must also place a security deposit with the province to ensure that the reclamation permit conditions are completed.

The environmental protection and reclamation objectives of the province's *Mines Act* and Code are to ensure:

- land and watercourses on mine sites in BC are reclaimed to a level of productivity equal to that which existed prior to mining;
- disturbed lands and water courses are re-integrated into the surrounding landscape;
- mining and mitigation requirements associated with metal leaching and acid rock drainage (ML/ARD) are conducted in a manner which prevents significant impacts to downstream or on-site biota and minimizes any reduction in post-mining productive capability of the site.

In order to achieve these objectives, the reclamation section:

- conducts detailed technical reviews of new projects or project revisions under the *Environmental Assessment Act*;
- conducts detailed technical reviews and issues permits for operating and closed mines with outstanding reclamation responsibilities under Section 10 of the *Mines Act*;
- inspects mine reclamation work and results;
- administers reclamation security deposits on behalf of the provincial government;
- organizes a number of provincial committees and activities which conduct technology transfer, review Ministry practices and enhance government/industry/public/academia cooperation, including the Technical and Research Committee on Reclamation, the Annual Reclamation Symposium, the Annual ML/ARD Workshop and the MEM Expert Advisory Committee for ML/ARD; and
- participates in national and international committees conducting research and technology transfer, including the mining industry's International Network for ARD Prevention (INAP) and the federal government's National Mine Environment Neutral Drainage (MEND 2000) Committee.

The reclamation section has expertise in the technical areas of soil restoration, re-vegetation, land capability, erosion control, geology, geochemistry, and metal leaching and acid rock drainage. Technical assistance is provided from within the Ministry on geotechnical and mining issues and by MELP on biological and effluent discharge requirements.

STRUCTURE AND ORGANIZATION

The Reclamation Section is comprised of the manager, a senior reclamation agrologist, a senior reclamation geologist, a reclamation geologist and two administrative staff located at headquarters. There are a total of four reclamation inspectors located in Cranbrook, Kamloops, Prince George and Smithers.

Summary of Activities

Permitting
The section enforces the reclamation provisions of the *Mines Act* through permit conditions and detailed technical reviews aimed at finding environmentally sound, economically viable solutions that enable industry to remain internationally competitive without compromising the province's rigorous environmental standards.

During 2000, permitting activity remained high. Three new permits were issued and 22 amendments were made to existing permits (Table 1).

Table 1: Summary of permit activity for 2000

Type	Permits	Amendments	Total
Metal	2	15	17
Coal	1	5	6
Quarries		2	2
Total	3	22	25

New permits were issued to Bluebell, Lumby and Tulameen Coal and permit revisions were made at Huckleberry(2), Golden Bear, Mount Polley(3), Sullivan, Gibraltar(3), Pacific Silica, Eskay Creek, Sable/Shasta, Pinchi Lake, Lawyers Mine; Quintette, Willow Creek, Tent Mountain, Coal Mountain and Greenhills; and Westrock Quarry(2). Under the *Environmental Assessment Act*, reviews were conducted for Eskay Creek's Tom MacKay Lake project, which deals with proposed lake disposal of tailings. The section also organized and participated on public committees reviewing activities at the Brenda, Endako, Equity Silver and Sullivan mines.

Cooperation and Consultation with Stakeholders
The section works closely with industry, other government agencies, First Nations and the public to inform them of our activities and ensure that all concerns are considered. For reclamation permits involving mechanical disturbance of the land surface, applications are referred to other government agencies, the public, and First Nations where their interests are affected. The section provides regular assistance to MELP, MOTH, Environment Canada, First Nations and the public on ML/ARD issues.

Cooperation engendered by the reclamation section between industry, the public, government, and the academic community through its various activities continues to result in a constructive climate for information exchange and dissemination of new technology.

Reclamation is the responsibility of each mining company. In order to improve industry practices, consultation with First Nations and general public understanding, the Ministry documents the conclusions of its technical reviews, enabling effective, constructive First

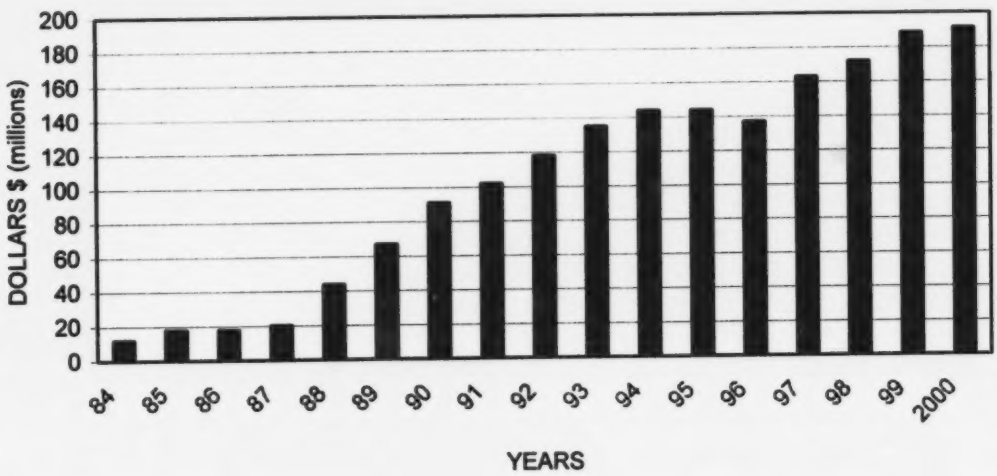
Nations and public consultation. In addition, the Ministry has produced specific guidelines on a number of reclamation issues including the reclamation of gravel pits and the prediction and prevention of metal leaching and acid rock drainage.

Metal Leaching and Acid Rock Drainage (ML/ARD)
The Ministry has produced a provincial ML/ARD policy, a more detailed set of ML/ARD guidelines, and a manual of recommended methods for the prediction of ML/ARD. These documents indicate what constitutes acceptable mine design and adequate technical evidence. They provide a checklist for industry and also inform the public of regulatory conditions and environmental protection requirements.

The major ML/ARD activity in 2000 was mine review, with ML/ARD providing a major part of reclamation permit conditions.

Reclamation Securities and Funds
All mines operating in B.C. must deposit security with the government to ensure that reclamation costs do not fall on provincial taxpayers (i.e., if a mining company goes bankrupt). In the past few years, the value of security deposits has increased to reflect more closely the true costs of reclamation. The total value of securities held by the province rose from $10 million in 1984 to more than $191 million by the end of 2000.

Reclamation Security Deposits Held by the Province of B.C., 1984 to 2000



Review of Contaminated Sites Policy
During 2000, Ministry staff worked closely with industry, environmental groups and the Ministry of Environment, Lands and Parks to resolve issues related to overlap of legislation between the *Mines Act* and the *Waste Management Act*. An independent consultant was hired to review the issue of environmental liability and provide recommendations on how best to ensure reasonable environmental protection and help contribute to a sustainable mining industry.

Historic Mine Sites Project
A project was initiated in 2000 to conduct an inventory of historic mine sites and determine the scope of the problem in British Columbia. Sites were identified by reviewing existing Ministry data and by undertaking field inspections. Longer-term objectives of the project included identifying high priority sites where environmental or health and safety issues exist, and determining if reclamation is necessary.

Field based inspections were conducted in July, August and September 2000, and included sites from all regions of the province. This work was undertaken with mines inspectors in each regional office in order to provide logistical support, and to rely on their experience and knowledge of the historic sites in their region. To date, about sixty sites have been inspected, which included sampling of mine drainage for analysis of heavy metal content as well as other documentation of site specific information.

Mine Reclamation Symposium
The 24th Annual Mine Reclamation Symposium was held from June 19 to 22, 2000 in Williams Lake, B.C. with a theme of "Planning for End Land Use." Delegates also toured the Gibraltar mine and the Mt. Polley mine with a stop at the huge Bullion Pit, which was mined for placer gold from the 1870's until 1942 using hydraulic monitors.

The Annual B.C. Mine Reclamation Award
The annual reclamation award and up to five citations are awarded for outstanding achievement in mine reclamation and have been presented at the BC Mine Reclamation Symposium every year since 1977.

This year, the British Columbia Mine Reclamation Award was presented to Highland Valley Copper Corporation for its work at the Highland Valley mine. Highland Valley Copper is recognised for its excellent program, which proves that mining can be carried out in a manner that minimizes impact on land and watercourses, leaving the land in a productive state. Their reclamation program is based on a comprehensive land use plan for the property, which seeks to reclaim to agricultural, wildlife, fisheries and recreational uses. In conducting their work, Highland Valley Copper has approached all issues using science and rigour and has fully shared their results with Government and the public.

Three citations were also awarded to the following:

- Coal mine reclamation - was awarded to Fording Coal Limited for their Henretta Creek restoration project at the Fording River Operations.

- Metal mine reclamation - was awarded to Greater Vancouver Regional District's Biosolids Recycling Program for reclamation work on the Granby Tailings pond near Princeton.
- Sand and gravel reclamation - was awarded to Columbia Bitulithic for their Pepin Creek restoration project at their Clearbrook operation.

Metal Leaching and Acid Rock Drainage Workshop
The 7th annual workshop was held in Vancouver on November 29 and 30, 2000. This year, the workshop addressed recent research, dry covers and the use of solubility constraints in the prediction of ML/ARD.

Technical and Research Committee on Reclamation
This committee has been active in promoting and fostering reclamation research and information exchange for more than two decades. Members are drawn from the Ministry of Energy and Mines, Ministry of Environment, Lands and Parks, mining companies, the Mining Association of B.C., the University of Northern B.C., the University of B.C., Camosun College, and the Coal Association of Canada. This committee has been responsible for the organization of the annual B.C. Mine Reclamation Symposium for the past 24 years.

INDUSTRY RECLAMATION RECORD
The mining industry in B.C. currently consists of large-scale open pit metal mines, open pit coal mines, underground metal mines and one underground coal mine.

Since the late 1960s, land cccupied by the mining industry has steadily grown. Major coal and metal mines, which occupied less than 1,000 hectares in 1969 had, by the end of 2000, expanded to cover 40,043 hectares. Reclamation (where revegetation has been successfully established for one year or more) has occurred on over 31 percent or 12,563 hectares (Figure 1).

Metal mines have disturbed 23,488 hectares, and 7,308 hectares (or 31 percent), have been reclaimed (Figure 2).

Coal mines have disturbed 16,535 hectares, and 5,252 hectares (or 32 percent) have been reclaimed (Figure 3). The sharp increase in disturbance and reclamation at metal mines during the late 1990's reflects the construction and development of three new mines Huckleberry, Mt. Polley and Kemess South and the closure and commencement of mine reclamation at others.

The data presented in Figures 1, 2 and 3 indicate that disturbance has been increasing at a faster rate than reclamation. This can largely be explained by the expansion of the mining industry during the past 30 years. Now that there has been a general industry decline, where mines are closing at a rate faster than they are opening, the rate of reclamation is expected to exceed the rate of disturbance.

Figure 1 - Land Disturbed and Reclaimed by Metal and Coal Mines, 1969 - 2000

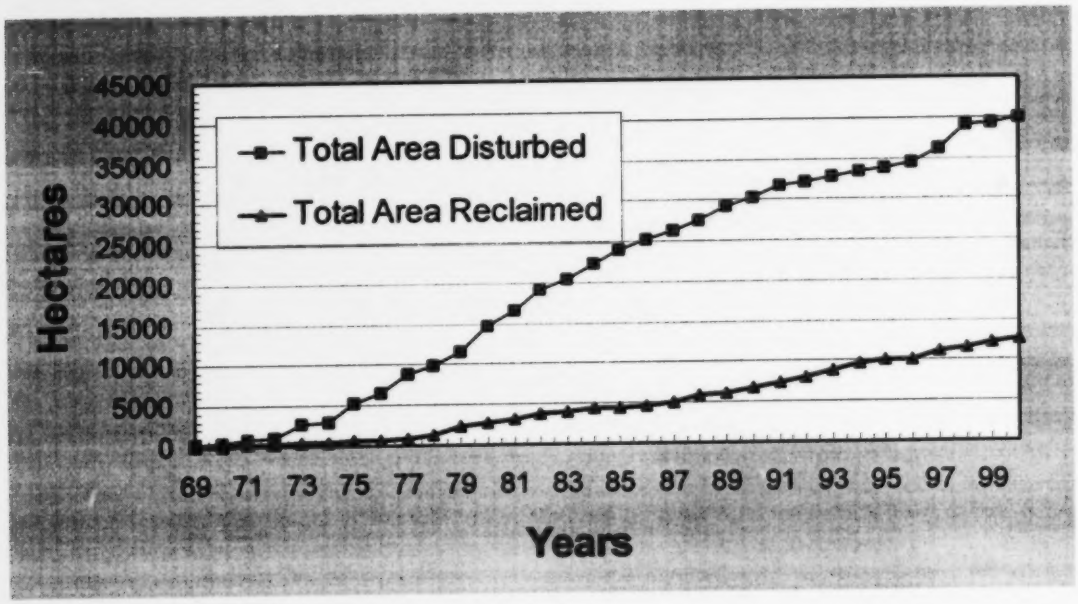


Figure 2 - Area Disturbed and Reclaimed by Metal Mines in B.C., 1969 - 2000

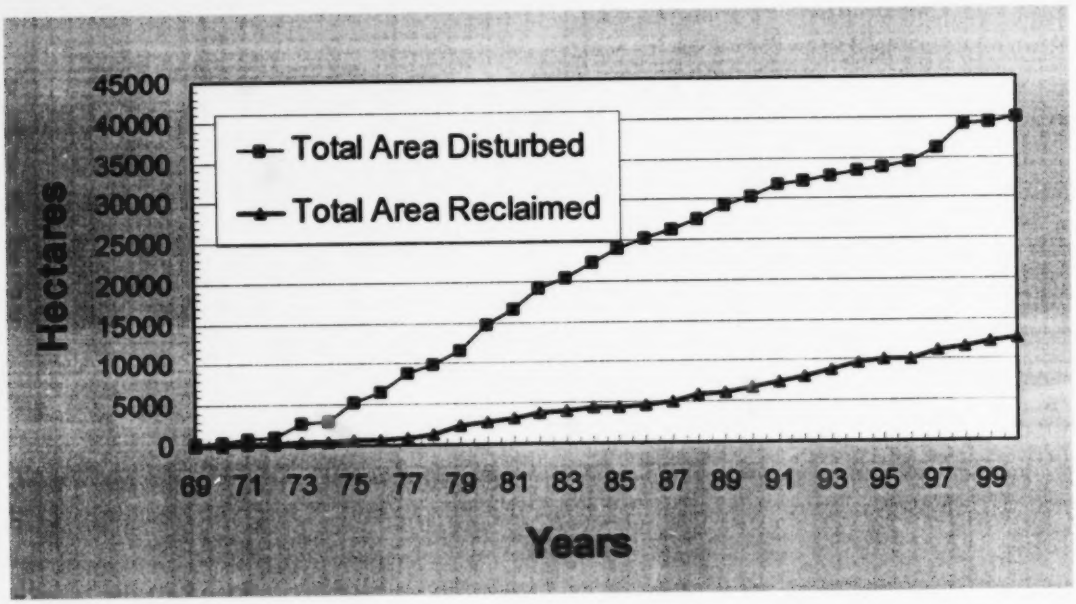
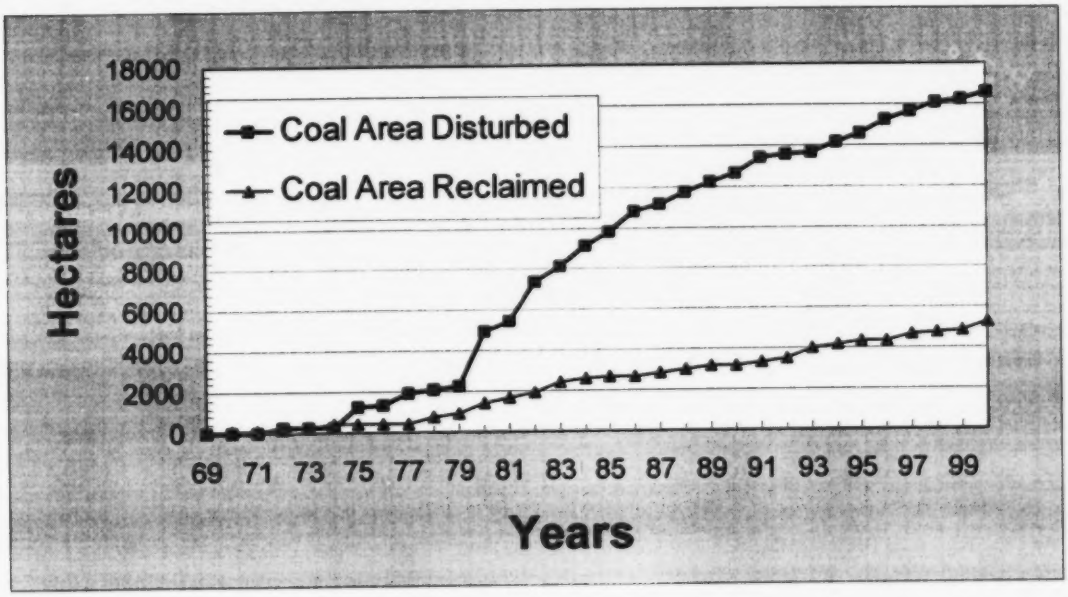


Figure 3 - Area Disturbed and Reclaimed by Coal Mines in B.C., 1969 - 2000



4.2 Geotechnical/Mining Roads

ROLES AND RESPONSIBILITIES

The geotechnical section reviews mine designs for the project review stage of the Environmental Assessment Act process, as well as the application of the Mines Act under Section 10. Other duties include the inspection of major geotechnical works at mines, the assessment of geotechnical performance for worker protection and public health and safety, and for protection of land and watercourses.

The section provides in-house technical expertise and policy advice for:

- Tailings impoundments and dams, sediment control structures, waste rock dumps, soil overburden dumps;
- Open pit and underground rock mechanics;
- Roads, including route selection, standards and construction; and
- Risk evaluation for worker protection and public health and safety, and environmental impact of geotechnical project.

ORGANIZATION

The section consists of a manager and an administrative assistant.

Summary of Activities
Compliance and Work Systems

In 2000, the geotechnical section:

- Conducted a total of 33 inspections at metal, coal and other mine locations;
- Issued a total of 21 Mines Act permits or permit amendments to metal, coal and other mine operations approving major geotechnical structures;
- Provided advice and design requirements on numerous other smaller project referrals or requests.

Liaison, Committees and Special Assignments
The major activities for this section involved liaising with colleagues in regional offices, other branches, other ministries, the general public, consultants, mining company engineers and employees about work systems, compliance, incidents, guidelines and research.

Mining Roads
The section was active in answering queries about old mining roads, supplying information to government ministries and the general public.